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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,854	06/28/2006	Gilles Mathieu	0501-1162	7884

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EXAMINER	
CHANG, JEFFREY HAO-WEI	
ART UNIT	PAPER NUMBER
3739	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary	Application No.	Applicant(s)	
	10/584,854	MATHIEU ET AL.	
	Examiner	Art Unit	
	JEFFREY H. CHANG	3739	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Applicant's comments and amendments, received 6/8/10, have been fully considered by the Examiner. In particular, Applicant's amendments to the Specification has overcome the objection to the Specification. Currently, claims 1-20 are pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **1, 4, 6-8, 10, 12-16, and 18-19** are rejected under 35 U.S.C. 102(b) as being anticipated by Seibel et al. (US 2001/0055462) (hereinafter as Seibel '462).

Regarding claim **1**, Seibel '462 discloses a miniature (see Abstract where scanning apparatus in endoscope may be considered miniature) confocal ([0119]) optical head for a confocal imaging system, in particular endoscopic (see Abstract), the head comprising:

a point source (i.e. optical fiber 244; Fig. 5H) for producing a light beam,

a ball lens (245; Fig. 5H) arranged at the end of the optical head (Fig. 5H shows ball lens 245 at the end of fiber 244), causing the light beam to converge into an excitation point (Fig. 5F shows light beam 230 converging into a point) situated in a subsurface field under observation of a sample (tissue or probe may be moved forward or backward to observe desired subsurface field),

the numerical aperture of the ball lens and dimensions of the point source being suitable to ensure confocality of the assembly (confocality inherently determined by aperture of lens and dimensions of source), and

scanning means (i.e. actuator 224; Fig. 5F) for displacing the point source in rotation (depicted by 212; Fig. 5D) along two axes passing through the center of the ball lens (see Fig. 5H where light is directed in at least two axes passing through center 246 of ball lens 245) so that the excitation point scans the field under observation (see Title where invention is directed to optical scanning),

wherein, the ball lens is partially arranged outside the body constituting the optical head (see, e.g., Fig. 3A where ball lens that would be disposed at tip of optical fiber 94 would be outside "bodies" such as stationary mechanical support 82, mechanical base 86, etc.) such that when the optical head is positioned on the sample, the outer part of the ball lens constitutes a protuberance pushing into the sample (see Fig. 10 where ball lens protrudes into body passage 510 because the ball lens is located in optical fiber assembly 500, which protrudes into the body passage 510, or, alternatively, Fig. 11B where when device is pressed enough into tissue, ball lens, located within the optical fiber assembly, protrudes into the tissue).

Regarding claim **4**, Seibel '462 discloses that the point source is integral with the ball lens (see [0092] where "ball lens 228 is affixed to the distal end of optical fiber 226").

Regarding claim **6**, Seibel '462 discloses that the optical head comprises a fine rigid curved plate (i.e. scan lens 248; Fig. 5H) used as a window (scan lens is transparent) designed to allow the ball lens to slide over the sample (scan lens 248 separates ball lens from tissue, allowing ball lens to slide over sample).

Regarding claim **7**, Seibel '462 disclose that the scanning means act directly on the ball lens (fiber 226 is affixed to ball lens 228, and actuator 224 is attached to fiber 226; therefore actuator 224 is attached to and acts directly on ball lens 228; Fig. 5F).

Regarding claim **8**, Seibel '462 discloses that the scanning means act directly on the point source (actuator 224 is attached to and acts directly on fiber 226; Fig. 5F).

Regarding claim **10**, Seibel '462 discloses that the scanning means comprise means for carrying out scanning (i.e. actuator 224; Fig. 5F) along two rotational axes of the ball lens (see Fig. 5H which shows multiple axes) so as to obtain a two-dimensional image (see, e.g., [0084]) in real time (see [0149]; "real-time optical image").

Regarding claim **12**, Seibel '462 discloses that the scanning means comprise micro-motors (see [0013]).

Regarding claim **13**, Seibel '462 discloses that the scanning means comprise piezoelectric elements (see [0160]; piezoelectric actuator).

Regarding claim **14**, Seibel '462 discloses that the scanning means comprise MEMS-type micromechanical means (see [0083]).

Regarding claim **15**, Seibel '462 discloses that the optical head comprises the terminal part of an optical fibre suitable for conducting the light beam from an external source (i.e. light sources 342, 344, 346, 348; Fig. 7A), the light beam emerging from the fibre constituting the point source (see Fig. 5F where light beams exiting fiber 226 become light beams 230).

Regarding claim **16**, Seibel '462 discloses that the optical fibre is monomode (see [0057] where "optical fiber 42 is preferably a single mode or hollow optical fiber") with a core diameter (all optical fibers have a core diameter) and a numerical aperture (see Fig. 3D where light beams

exiting scan lens 128 have an angle that terminate at a point on image plane 132 and therefore a numerical aperture exists) allowing a spatial filtering of the return signal and therefore ensuring the confocality of the head (see [0103] and [0119]).

Regarding claim **18**, Seibel '462 discloses a confocal imaging system comprising: a confocal optical head according to claim 1 with integrated scanning (see rejection for claim 1); a source suitable for emitting a light beam (i.e. light sources 342, 344, 346, and 348; Fig. 7A); means of detecting an emitted signal (i.e. RGB imaging detectors; Fig. 6A); means for electronic and computer control and processing of the emitted signal suitable for reconstructing a confocal image of a field image (i.e. computer workstation and spectrum analyzer 274 process image data, and RGB video display 276 displays image; Fig. 6B).

Regarding claim **19**, Seibel '462 discloses a first optical fibre (365; Fig. 7B) connected to a laser source (i.e. light sources 342, 344, 346 may be laser sources; [0093]; Fig. 7B), coupling means (366; Fig. 7B) for coupling the first optical fibre with a second optical fibre (360; Fig. 7B) for transport to and from the optical head, and a third optical fibre (252; Fig. 6A) for transporting the emitted signal to the detection means (i.e. RGB detectors; Fig. 6A).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims **2 and 3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Seibel (US 2001/0055462) in view of Boppart et al (US Pat. No. 6,485,413 B1).

Regarding claim **2**, it is noted that Seibel '462 does not disclose that the point source pivots independently of the ball lens. However, Fig. 6C of Boppart et al discloses that the point source pivots independently of the ball lens (distal tip of optical fiber 58 pivots based on arrow direction independently of fixed GRIN lens 62, where ball lens of Seibel may replace GRIN lens of Boppart). It would have been obvious to one having ordinary skill in the art at the time of invention to fix the ball lens of Seibel '462, and therefore have the point source pivot

independently of the ball lens, as taught by Boppart et al as fixing the ball lens allows for more consistent scanning as opposed to a ball lens having slight movements. In fact, Seibel '462 teaches that a fixed ball lens is preferred (see [0092]).

Regarding claim **3**, Seibel '462 discloses that the distance between the point source and the centre of the ball lens is kept constant (see Fig. 5H and [0092] where "ball lens 228 remains generally stationary due to its inertial mass" while the point source vibrates) so that the field under observation is curved (see Fig. 5B with curved field 169a and 169b).

7. Claim **5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Seibel (US 2001/0055462) in view of Wilta et al (European Pub. No. 0 664 101 A1).

Regarding claim **5**, it is noted that Seibel '462 does not explicitly disclose a liquid introducing means as required. However, Wilta et al discloses means for introducing a liquid between the external surface of the ball lens and the sample so as to ease the sliding of the ball lens over the sample (col. 5, lines 20-37; where cuff 46 directs liquid over lens of borescope 12 for washing the lens). It would have been obvious to one having ordinary skill in the art at the time of invention to modify the ball lens system of Seibel '462 with the liquid introducing means as taught by Wilta et al, as a layer of liquid may beneficially be used to clean and defog the lens.

8. Claim **9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Seibel (US 2001/0055462) in view of Seibel et al (US Pat. No. 6,294,775 B1) (hereinafter as Seibel '775).

Regarding claim **9**, it is noted that Seibel '462 does not explicitly disclose a corrective optical means integral with the point source and arranged between the point source and the ball

lens. However, Seibel '775 discloses a corrective optical means (i.e. lens 37) integral with the point source (col. 4, lines 46-48; where lens 37 is fused bonded, or mounted to distal tip) and arranged between the point source and the ball lens (see Fig. 2; col. 4, lines 54-57; where lens 37 is placed between distal tip and second lens 39) in order to correct residual aberrations of the ball lens (col. 4, lines 44-64; col. 8, lines 35-50). It would have been obvious to one having ordinary skill in the art at the time of invention to modify the fiber-ball lens system of Seibel '462 with the feature of the corrective optical means placed between point source and ball lens as taught by Seibel '775, as a lens placed between the distal tip of an optical fiber and ball lens would reduce unwanted aberrations as suggested by the base reference, Seibel '462 ([0091]).

9. Claim **11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Seibel (US 2001/0055462) in view of Crossman-Bosworth et al (US Pub. No. 2004/0151466 A1).

Regarding claim **11**, it is noted that Seibel '462 does not disclose scanning at 4kHz. However, Crossman-Bosworth et al discloses that scanning along one of the two rotational axes (taught by Seibel '462; see rejection of claim 1) reaches a frequency of approximately 4 kHz (Crossman-Bosworth: [0062]; where system runs at 4,090Hz). It would have been obvious to combine scanning at approximately 4kHz taught by Crossman-Bosworth with the optical scanning apparatus of Seibel '462 as such a scan frequency would allow for smooth, real-time imaging of the region of interest in Seibel '462. Furthermore, both Crossman-Bosworth and Seibel '462 prefer scanning at second mode resonance of the optical fiber (Crossman-Bosworth: [0062]; Seibel '462: Fig. 5C and last sentence of [0088]), which 4,090Hz taught by Crossman-

Bosworth is for an optical fiber with diameter of 59 microns, a reasonable sized fiber for use in the Seibel '462 device.

10. Claims **17 and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Seibel (US 2001/0055462) in view of Crossman-Bosworth et al (US Pub. No. 2004/0151466 A1) and Chang-Hasnain ("Tunable VCSEL").

Regarding claims **17 and 20**, it is noted that Seibel '462 does not disclose use of a VCSEL-type laser source. However, Crossman-Bosworth et al and Chang-Hasnain disclose that the point source is constituted by a VCSEL-type laser source (Crossman-Bosworth: [0097]), having a numerical aperture (Crossman-Bosworth: lines 16-23 of [0049]; where numerical aperture is required for both laser and optical fiber sources) and a cavity outlet diameter compatible with a confocal system (inherent in VCSEL that metal top-layer contains a diameter to allow laser from active or gain region to pass; see Fig. 2 and 8b of Chang-Hasnain "Tunable VCSEL"), and associated with a detector placed behind the VCSEL cavity (inherent in VCSEL that bottom mirror placed behind VCSEL acts as a detector; see Fig. 2 and 8b of Chang-Hasnain "Tunable VCSEL"). It would have been obvious to one having ordinary skill in the art at the time of invention to use VCSEL laser sources as taught by Crossman-Bosworth and Chang-Hasnain as wavelengths of VCSELs are easily changed, and therefore relatively similar VCSEL sources may be used as the light sources depicted in Figs. 7A-7C of Seibel '462, thereby decreasing manufacturing costs related to the light sources. Furthermore, because the light emitting portion of VCSELs is vertical facing, the VCSELs may be fabricated in large arrays, further decreasing manufacturing costs related to the light sources.

Further regarding claim **20**, Fig. 5F of Seibel '462 discloses that the system comprises flexible connection means (i.e. light detector leads 234 or leads 236 to drive actuator) between the optical head and the signal processing means.

Response to Arguments

11. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY H. CHANG whose telephone number is (571) 270-5336. The examiner can normally be reached on Monday - Thursday, 8:00 am - 5:00 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Linda Dvorak can be reached on (571) 272-4764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. H. C./
Examiner, Art Unit 3739

/Linda C Dvorak/
Supervisory Patent Examiner, Art Unit 3739